2008

Point Source Power Generation Using a Sterling Engine

Luis Espaillat
Worcester Polytechnic Institute

Joe Gennosa
Worcester Polytechnic Institute

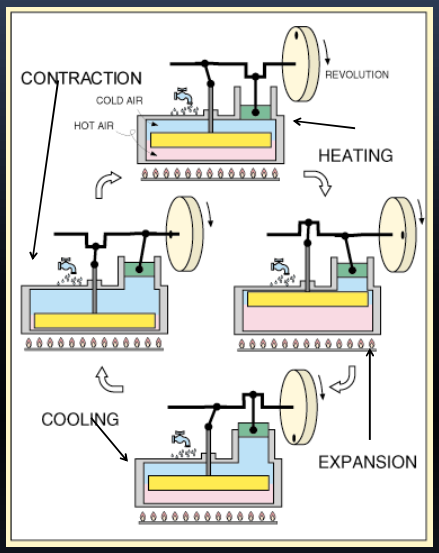
Jeff Rosen
Worcester Polytechnic Institute

Point Source Power Generation Using a Sterling Engine

ABSTRACT

Fossil fuels are what primarily provide everyone with energy and power. Scientists and engineers have been searching for an alternative way to provide energy in a sustainable, renewable, and environmentally friendly way. Looking at the constant source of energy provided by the sun, this source could be harnessed in a way that could continually make energy. Using a Stirling engine, the solar energy from the sun could power the engine to produce enough mechanical engines to power a house. This newer technology would help make more of the energy used in the world more environmentally friendly and provide means for single houses to acquire economically feasible, sustainable, and renewable power.

1. Stirling Engine



Heating
- The gas is moved to the heated side of the chamber which will cause its pressure to increase

Expansion
- The air expand and moves the piston upwards creating rotational motion

Cooling
- The displacer is moved back down by the momentum of the rotational motion and allow the air to move to the cooling side; decreasing pressure

Contraction
- The air contracts because of the decreasing pressure allowing the piston to go back to the beginning of the cycle to start again

2. Solar Oven

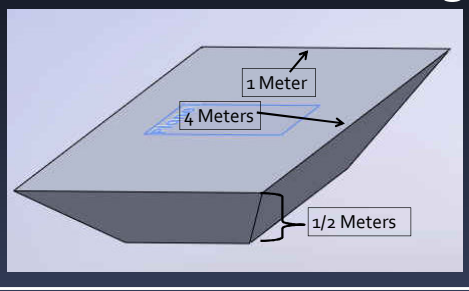
- Heats to 150°C
- Cooks food fast
- No energy cost to cook
- Environmentally Beneficial
- Healthy

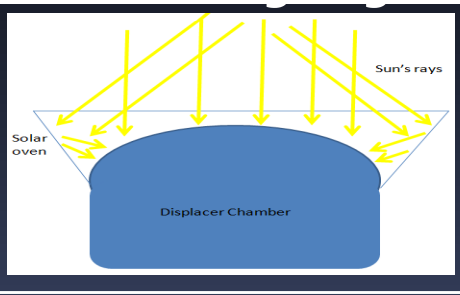
Color
- The darker the better
- Dull better than shinny

Shape
- Shallow better than tall

Thickness
- The thinner the better

3. Solar Stirling Engine





- Solar oven powers Sterling engine
- Uses aluminum reflectors
- Dulled copper to conduct heat
- Vacuum between solar oven and displacer

4. Other Companies

- Converging mirror
- 3 kw design
- 21 feet tall x 15 feet in diameter
- Consumer product
- Follows sun

- Converging mirror
- 25 kw design
- 40 feet tall x 38 feet in diameter
- Used in solar farms
- Has 82 3' by 4'mirrors

5. Conclusions

	Our Design	Infinia	SES	Solar Cell
Amount of Energy Producible (kW)	1	3	25	2
Height of System (ft)	3	21	41	1<
Size of Base of System (ft^2)	45	225	1400	12
Efficiency (%)	30	24	Unlisted	15

Team Adidas
Jeff Rosen
Joe Gennosa
Luis Espaillat

Selected Bibliography
Hiram, Kosch. "Displacer Engine Detail." American Stirling Company. 11/30/2008 <http://www.stirlingengine.com/Displacer-Still.adp>.
"Infinia Solar System." Infinia Corporation. 11/30/2008 <http://www.infiniacorp.com/applications/solar/ss_index.html>.
"Sport Solar Oven & Reflector Instruction Manual." Solar Oven Society. 11/30/2008 <http://www.solarovens.org/buy.html>.
"Suncatcher." Stirling Energy Systems. 11/30/2008 <http://www.stirlingenergy.com/technology/suncatcher.asp>.

WPI — Worcester Polytechnic Institute — 1865